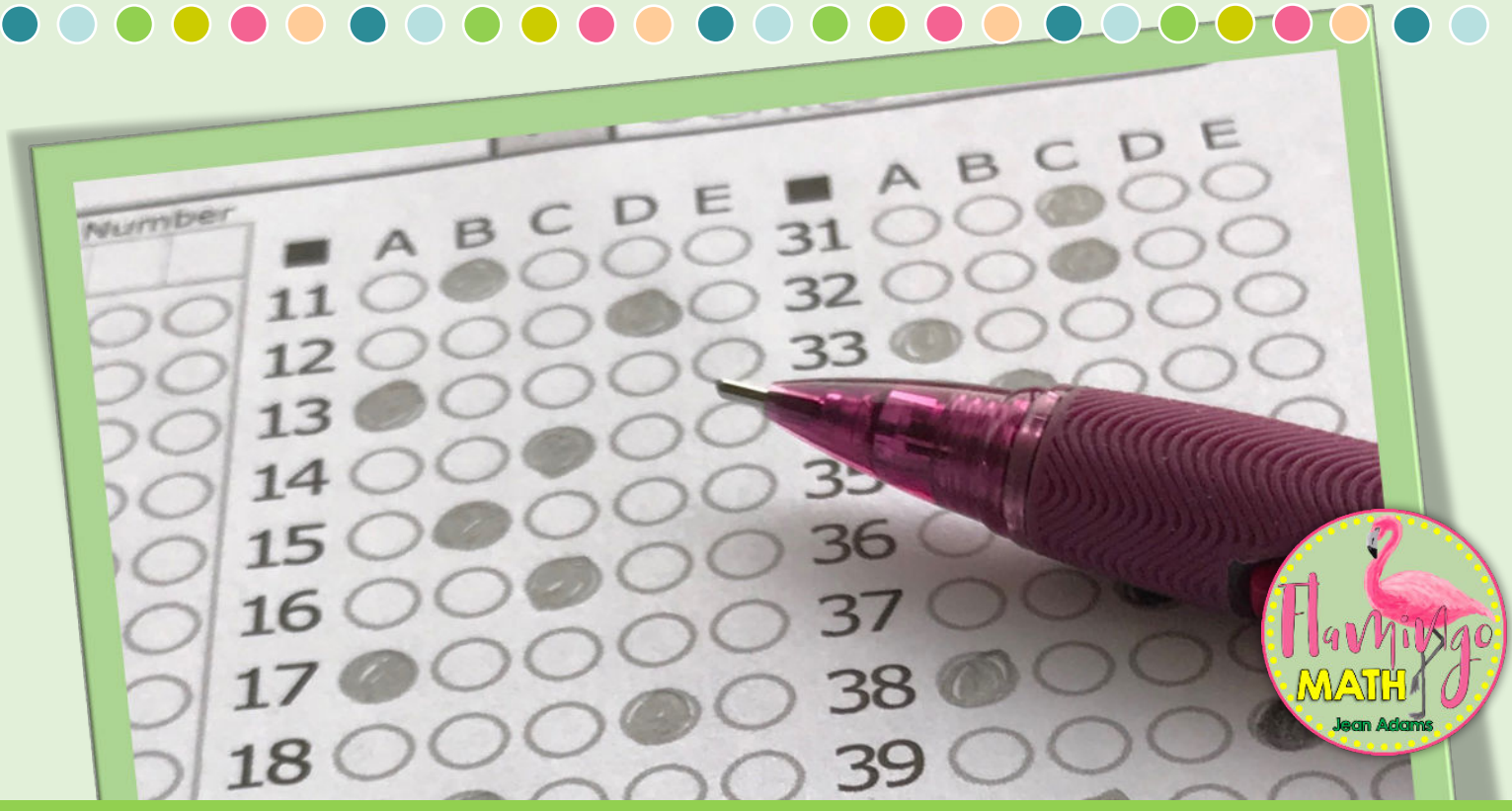
Precalculus Honors

Final Exam and Review



Editable Assessments

Precalculus Honors Year-End Review & Exam

This resource is designed for a Precalculus Honors course.

Product Overview

YEAR-END REVIEW & FINAL EXAM

Here is a comprehensive review packet of 100 questions for your PreCalculus Honors students to prepare for their Final Exam. The answers are included at the end of the packet so students will know they are on the right path.

The content covers units 1-10 in my full year curriculum and include two different versions of a multiple-choice exam:

- Form A is 40 questions and excludes the matrix chapter.
- Form B is 45 questions and includes the matrix chapter.

There is also a MICROSOFT WORD® version that is fully editable if you need to adjust the questions to meet your district and personal needs.

You will also find a 50-question ZIP GRADE PDF document if you need one.

There are 52 pages of rigorous material to prepare your students and test them at a level that lets you know their true abilities for the entire course.

Teacher Notes – Using the Resource

All review assignments, quiz, and test items are both in PDF format and Microsoft Word for creating and altering items to meet your teaching needs, *minimize your prep time, and offer a variety of assessment instruments.*.



Precalculus Final Exam

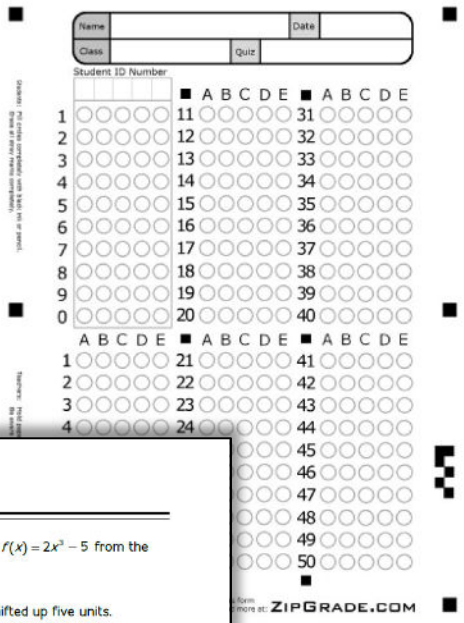
Version A –

You may write o

Name: _____

Date _____ Period: _

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Pre-Calculus Final Examination – Form A

1. State the transformations that have occurred to create the function $f(x) = 2x^3 - 5$ from the function $g(x) = x^3$.

   [A] The graph of the function has been stretched horizontally and shifted up five units.

   [B] The graph of the function has been stretched vertically and shifted up five units.

   [C] The graph of the function has been stretched horizontally and shifted down five units.

   [D] The graph of the function has been stretched vertically and shifted down five units.

2. What is the range of the function $f(x) = 4 - 2(x+3)^2$?

   [A] $[4, \infty)$

   [B] $(-\infty, 4]$

   [C] $(-\infty, -4]$

   [D] $(-\infty, \infty)$

3. Find the inverse function of $g(x) = x^3 + 7$

   [A] $g^{-1}(x) = \sqrt[3]{x} - 7$

   [B] $g^{-1}(x) = \sqrt[3]{x+7}$

   [C] $g^{-1}(x) = \sqrt[3]{x-7}$

   [D] $g^{-1}(x) = \left(\frac{x+7}{3}\right)^3$

4. Find the $f(g(x))$ given $f(x) = \sqrt{x+2}$; $g(x) = 8x -$

   [A] $f(g(x)) = 2\sqrt{2x-1}$

   [B] $f(g(x)) = 8\sqrt{x+2} - 6$

   [C] $f(g(x)) = 8\sqrt{x-4}$

   [D] $f(g(x)) = 2\sqrt{2x+1}$

5. Rewrite the expression as a single logarithm. $7\ln(x$

   [A] $\frac{\ln(7xy)}{\ln(5yz)}$

   [B] $\ln\left(\frac{x^7y^2}{z^5}\right)$

   [C] $\ln\left(\frac{7x}{5z}\right)$

   [D] $\frac{\ln(x^7y^7)}{\ln(y^5z^5)}$

6. What value of x satisfies the equation $\log_5(2x+1) = 2$

   [A] 13

   [B] 12

   [C] 5.5

   [D] 4.5

7. Find an approximate solution $2e^{5x-2} = 12$.

   [A] 2.800

   [B] –0.042

   [C] 0.648

   [D] 0.758

8. In the formula $A(t) = A_0e^{kt}$, $A(t)$ is the amount of radioactive material that remains from an initial amount A_0 at a given time t and k is a negative constant. A certain radioactive isotope decays at a rate of 0.2% annually. Determine the half-life of the isotope to the nearest year.

   [A] 3 years

   [B] 151 years

   [C] 347 years

   [D] 250 years

9. The number of students infected with the flu on a college campus after t days is modeled by the function $P(t) = \frac{240}{1+39e^{-0.3t}}$. When will the number of infected students be 120?

   [A] About 8 days

   [B] About 12 days

   [C] About 14 days

   [D] About 16 days

10. Find $\tan\theta$, given $\sec\theta = \frac{7}{2}$ and θ is in Quadrant IV.

[A] $-3\sqrt{5}$

[B] $\frac{-3\sqrt{5}}{2}$

[C] $-\frac{7}{2}$

[D] $\frac{-3\sqrt{5}}{7}$

11. Factor and simplify: $\cos^2 x - \sin^2 x \cdot \cos^2 x$

[A] $\cos^4 x$

[B] $-\cos^4 x$

[C] $2\cos x$

[D] $1 - \sin^2 x$

12. Which expression completes the Pythagorean Identity for $\tan^2\theta =$

[A] $1 - \sec^2\theta$

[B] $\csc^2\theta + 1$

[C] $1 - \csc^2\theta$

[D] $\sec^2\theta - 1$

13. Consider the two trigonometric functions:

$$f(x) = 2\cos(3x) - 5$$

$$g(x) = 2\cos\left(3x - \frac{\pi}{2}\right) - 5$$

[A] Shift the graph of f to the right $\frac{\pi}{2}$ units to produce the graph of g.

[B] Shift the graph of f to the left $\frac{\pi}{2}$ units to produce the graph of g.

[C] Shift the graph of f to the right $\frac{\pi}{6}$ units to produce the graph of g.

[D] Shift the graph of f to the left $\frac{\pi}{6}$ units to produce the graph of g.

14. Find the exact value of the expression $\cos\left(\sin^{-1}\frac{1}{2}\right)$

[A] $\frac{\sqrt{2}}{2}$

[B] $\frac{\sqrt{3}}{2}$

[C] 1

[D] 0

15. A security camera is mounted on a wall 7.4 feet above an information desk in an office building. It is used to record activity at an entrance door 9.3 feet from the desk. Find the angle of depression, to the nearest degree, from the camera to the entrance door.

[A] 53°

[B] 51°

[C] 39°

[D] 37°

16. Consider the formula $T = 591 - 76\cos 2\theta$, where θ is measured in degrees. To the nearest hundredth of a degree, what is the smallest positive value of θ for which the value of T will be 607?

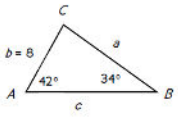
[A] 51.08°

[B] 102.15°

[C] 48.08°

[D] 105.15°

17. Solve the triangle, shown at right.



[A] C = 104°, $a \approx 6.7$, $c \approx 11.6$

[B] C = 14°, $a \approx 6.7$, $c \approx 11.6$

[C] C = 104°, $a \approx 6.7$, $c \approx 14$

[D] C = 104°, $a \approx 9.6$, $c \approx 14$

18. Triangle CAT has the following properties:

- The angle at vertex A is 125°
- The two sides adjacent to the vertex angle are 9 and 15 respectively.

What is the ***approximate*** length of the side opposite vertex A?

[A] $a \approx 10.1$ units

[B] $a \approx 21.5$ units

[C] $a \approx 46.1$ units

[D] $a \approx 461$ units

19. An office building has a handicap ramp at the entrance to the front door. If the distance from the building to the end of the ramp is 13 feet and the height from the ground to the front door is 8 feet, how long is the ramp?

[A] 4.6 ft

[B] 10.2 ft

[C] 15.3 ft

[D] 11.3 ft

20. Find the magnitude and direction angle for the vector $\langle -15, -2 \rangle$

[A] $\sqrt{229}, 187.6°$

[B] $\sqrt{229}, 262.4°$

[C] $\sqrt{229}, 172.4°$

[D] $\sqrt{229}, 97.6°$

21. Find 8u − 5v. Given u= 5i + 6j and v = −7i + 2j

[A] 5i + 58j

[B] 88i + 25j

[C] 75i + 38j

[D] −16i − 40j

Pre-Calculus Honors
Final Examination Review

Name _____

1. State the intervals on which the function is increasing and decreasing.
$g(x) = x^3 - x^2 + 3$.

2. Find the horizontal asymptote of the function $h(x) = \frac{8x^2}{6 - 4x^2}$

3. Find the vertical asymptote(s) of the function $r(x) = \frac{x-5}{x^2 - 4x - 45}$

4. Find $g(f(x))$ for $f(x) = 4x^2 + x + 5; g(x) = 3x - 2$

5. Find $f(g(x))$ where $f(x) = \sqrt{x+8}$ and $g(x) = 8x - 12$

6. Describe how to transform the graph of f into the graph of g. $f(x) = (x+5)^2$ and $g(x) = -2(x+5)^2 - 3$

7. The graph of $f(x) = x^2 - 4x + 3$, is horizontally shrunk by a factor of $\frac{1}{2}$.

9. Write the quadratic function in vertex form.
$y = x^2 + 6x + 1$

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11. The perimeter of a rectangle is 68 feet. If the width were doubled and the length increased by 13 feet, the perimeter would be 118 feet. Find the length and width of the rectangle.

12. The volume V of a given mass of gas varies directly as the temperature T and inversely as the pressure P. If V =312 in³ when T =260°and P = 10 lb/in², what is the volume when T =400° and P = 10 lb/in²?

13. Find the zeros and state the multiplicity of each. $f(x) = 5(x+7)^2(x-4)^3$

14. Find the zeros of the function $g(x) = x^3 - 9x^2 + 26x - 24$

16. Find all the real zeros $h(x) = x^3 - 5x^2 - 3x + 15$

18. Use synthetic division and write the quotient. $\frac{2x^3 + 3x^2 + 4x - 10}{x+1}$

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19. Describe the end behavior of the function $f(x) = 7x^2 - 7x^3 + 3x + 10$

20. Use limits to describe the end behavior of the function $f(x) = \frac{x+1}{x^2 - 2x}$

21. Lazer Lighting found that the supply and demand functions for their best-selling outdoor lights are: $S(p) = 400 - 4p + 0.00002p^4$ and $D(p) = 2800 - 0.0012p^3$, where p represents the price. Find the price for the product where the supply equals the demand.

22. Ciarra works for Canaveral National Seashore and found that an endangered crab population can be modeled by the function $P(t) = -0.00009t^3 + 0.024t^2 + 10.5t + 1800$. If this model continues to be an accurate predictor, when will this population become extinct?

23. Evaluate. $\log_9\left(\frac{1}{81}\right)$

24.

25. Write as a difference: $\log\frac{17\sqrt{x}}{y}$

26.

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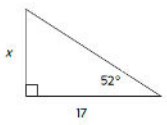
27. Find the exact solution $3\ln(x-9) = 1$

29. Solve. $\log 5x = \log 3 + \log(x+2)$

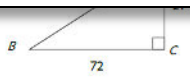
31. Find the radius if the arc length $s = 14$ cm and $\theta = 42°$, given $s = r\theta$

33. Assume that θ is and acute angle in a right triangle where $\cos\theta = \frac{5}{6}$. Find $\tan\theta$

34. Solve for x.



35. Solve the right triangle for all missing sides and angles to the nearest tenth. Given $B = 25.9°, c = 28.4$



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36. A kite is flying at an altitude of 16 meters above the ground. If the angle of elevation from the ground to the kite is 30°, find the length of the kite string to the nearest meter.

37. Suppose that θ is an angle in standard position and $(-5,12)$ is a point on the terminal side of θ. Find $\sin\theta$.

38. Find the angle θ where $\sin\theta = -\frac{1}{2}$ and $\sin\theta < 0$.

39. Find the period of the function $y = 2\cos\frac{1}{3}x$

40. Find the zeros of the function for $[0, 2\pi)$ $f(x) = 3\cos x$

41. Find the zeros of the function for $[0, 2\pi)$ $f(x) = -4\sin 2x$

42. Simplify: $\frac{\sin^2 x - 1}{\cos(-x)}$

43. Simplify: $\frac{1 - \sin^2 x}{\sin x - \csc x}$

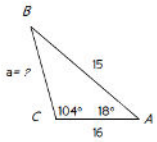
44. Factor: $\sin^2 x + \sin x - 2$

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53. Solve the triangle. $a=5, b=11, c=8$

54. Use Law of Sines to solve the triangle.



55. A tower is supported by a guy wire 459 feet long. The wire makes an angle of 35° with respect to the ground and the distance from the point where the wire is attached to the ground and the tower is 209 ft, how tall is the tower to the nearest tenth?

56. Given $P=(17,3)$ and $Q=(9,8)$ find the component form and magnitude of the vector $\overrightarrow{QP}$.

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58. Find the angle between the given vectors to the nearest tenth of a degree. $\langle t\sqrt{7}\rangle$ and $\langle -1,9\rangle$

59. The angle between a 150-pound force F and $\overrightarrow{AB}=2i+4j$ is 30°. Find the work done by F in moving an object from A to B.

60. Eliminate the parameter $x=t-3; y=t^2+5$

61. Convert the polar coordinates $\left(-4,-\frac{\pi}{3}\right)$ to rectangular coordinates.

62. Find two pairs of polar coordinates for the

63. Convert the polar equation to rectangular form. $r=\frac{5}{1+\cos\theta}$

polar

65. Write the complex number in trigonometric form. $-5+5\sqrt{3}\,i$

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66. Write the complex number ins standard form. $\sqrt{6}\,(\cos 315° + i\sin 315°)$

67. Use DeMoivre's Theorem to raise the complex number to a power. $\left[5\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right)\right]^3$

68. Multiply $z_1 \cdot z_2$
$z_1 = 5(\cos 45° + i\sin 45°)$
$z_2 = 3(\cos 200° + i\sin 200°)$

69. Find the quotient. $\frac{9(\cos 8\pi + i\sin 8\pi)}{4(\cos 5\pi + i\sin 5\pi)}$

70. Subtract $\begin{bmatrix}-1 & 0\\ 6 & 3\end{bmatrix} - \begin{bmatrix}-1 & 6\\ 3 & 1\end{bmatrix}$

71. Multiply $\begin{bmatrix}0 & -2\end{bmatrix}\begin{bmatrix}-2 & 0\end{bmatrix}$

72. Solve the system of equation using reduced row echelon form for matrices.
$x+y+z=3$
$x-y+3z=7$
$2x+y+z=-2$

73. W
v

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82. Given the infinite geometric series, find the limit if the series converges.
$\frac{1}{1024}+\frac{1}{256}+\frac{1}{64}+\frac{1}{16}+\cdots$

84. Find the limit. $\lim_{x\to 7}\frac{x^3-49}{x-7}$

86. Find the limit if it exists. $\lim_{x\to -4} f(x)$

$$f(x)=\begin{cases}-4-x & x<-4\\ 6 & x=-4\\ x+10 & x>-4\end{cases}$$

87. Find the limit and identify vertical asymptotes. $\lim_{x\to 3^-}\frac{x}{x-3}$

88. Find the limit. $\lim_{x\to 0} f(x)=-8$ and $\lim_{x\to 0} g(x)=10$. Find $\lim_{x\to 0}\left[f(x)+2g(x)\right]$

89. Let $\lim_{x\to 4} f(x)=10$ and $\lim_{x\to 4} g(x)=-3$. Find $\lim_{x\to 4}\left[f(x)+g(x)\right]^2$

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90. Use the definition of the derivative to find the derivative of $f(x)=5x+9$

91. Use the definition of the derivative to find the derivative of $f(x)=\sqrt{x+7}$

92. Find the derivative of the function at $x=0$, $f(x)=x^2+7x-2$

93. Find the derivative of the function at $x=-2$, $f(x)=2x^3-5x$

Use the graph at right to find the following.

94. $\lim_{x\to -\infty} f(x)$

95. $\lim_{x\to -5} f(x)$

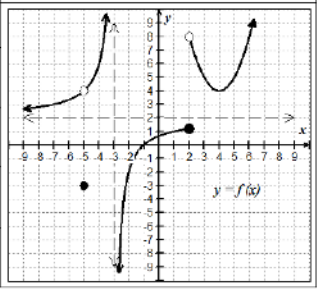
96. $\lim_{x\to 4} f(x)$

97. $\lim_{x\to 2^+} f(x)$

98. $\lim_{x\to 2^-} f(x)$

99. $\lim_{x\to 2} f(x)$

100. $\lim_{x\to -3^+} f(x)$



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